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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/770,797	02/03/2004	Donald L. Yates	150.00840102	1476

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EXAMINER	
WEBB, GREGORY E	

ART UNIT	PAPER NUMBER
1751	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/770,797	YATES ET AL.	
	Examiner	Art Unit	
	Gregory E. Webb	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-30 and 33-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-30 and 33-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

5/14/07

DETAILED ACTION

Response to Amendment/Arguments

The following is in response to the applicant's amendments and arguments submitted 2/28/07.

Concerning the contested dates of the references, the examiner agrees with the applicant's priority date of June 17th, 1999. As such the previous 102(b) rejections have been adjusted accordingly.

Concerning the Grieger et al reference, the applicant makes several arguments including: lack of teaching "used to clean" language; and the Grieger compositions require water.

Grieger does not require the inclusion of water. Although aqueous compositions are taught throughout the reference, Grieger clearly anticipates non-aqueous compositions. For example the following paragraph illustrates that water is not required and can be substituted for various solvents:

> (7) To prepare a cleaning composition from TAAF, the TAAF is combined with a solvent. The solvent may be water, an organic solvent, or a combination thereof. Suitable organic solvents include hydroxyl-containing solvents such as methanol, ethanol, n-propanol, iso-propanol, n-butanol, t-butanol, iso-butanol, sec-butanol, ethylene glycol, propylene glycol and mono- and polyhydric alcohols having

> higher carbon number. The composition is easily prepared simply by combining TAAF and solvent, and mixing these materials together to form a homogeneous composition, preferably a solution.

It is clear from this paragraph that TAAF can be combined with water or various other solvents. In this paragraph it is also clear that the TAAF is combined only with a solvent and would thus meet both the "consisting of" and "consisting essentially of" transitional language.

Concerning the intended use arguments and in particular that the prior art fails to teach the composition "is in contact with a substrate having a polymeric etch residue on at least one surface." Such language is clearly directed to the intended use of the composition and not directed to actual material limitations of the composition. Although this language cannot be ignored, such language is given a lesser weight than material limitations. Support can be found in the following case law recited from the MPEP:

> "It should be noted that intended use recitations and other types of functional language cannot be entirely disregarded. However, in composition claims, intended use must result in structural difference between the claimed invention and the prior art in order to patentable distinguish the claimed invention from the prior art (see MPEP 2111.02). Furthermore, applicant may not rely upon the preamble to distinguish his claimed composition from that of the prior art, where the preamble does not constitute a limitation of a claim when it states a purpose or intended use (see Loctite Corp. V. Ultraseal Ltd., 781 F.2d 861, 868, 228 USPQ 90, 94 (Fed. Cir. 1985))."

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 27-30, and 33-50 are rejected under 35 U.S.C. 102(a) as being anticipated by Clark (WO 98/40338; PCT publication date 9/17/1998; which is equivalent to the US 6,274,770 B1).

Concerning the organic solvent, Clark teaches the following:

> A preferred alkyl cyanide compound is acetonitrile. A preferred ether is **tetrahydrofuran**. Solvents having --S.dbd.O moieties include alkyl and/or aryl (including alkyl/aryl) sulphones and **sulphoxide**s including cyclic compounds. Preferred **amides** may be aliphatic or cyclic. Preferred solvents include acetonitrile, **tetrahydrofuran**, **ethers**, dimethyl**sulphoxide**, dimethylacetamide, **dimethyl formamide**, N-methylpyrrolidone, sulpholane, diphenylsulphone and diphenyl**sulphoxide**. Especially preferred solvents are solvents having --S.dbd.O moieties and **amides** as described. (*emphasis added*)

Concerning the quaternary ammonium fluoride, preferred cation, phosphonium, fluoride ion source and the ammonium hydrogen fluoride, Clark teaches the following:

> Preparation of the ammonium or **phosphonium fluoride** derivatives may be accomplished using standard procedures. For example, **tetramethylammonium fluoride** may be prepared in situ by reaction of tetramethylammonium chloride with potassium **fluoride**, optionally in the presence of a phase transfer catalyst, for example as described in J.Org.Chem 1989,54,4827. Many ammonium or **phosphonium fluoride** derivatives are commercially available. (*emphasis added*)

Concerning the sulfonium, Clark teaches the following:

> 8. A process according to claim 1, wherein said fluorinating system is selected from ammonium, phosphonium and **sulphonium** fluoride derivatives. (*emphasis added*)

Concerning the water free, Clark teaches the following:

> Said process is preferably carried out in the presence of a solvent. Said solvent is preferably aprotic. Said solvent is preferably **non-aqueous**.

> Said solvent is preferably substantially **free of water**, at least at the beginning of the process. The solvent may be polar or non-polar. It is preferably polar and adapted to stabilise intermediates formed during the process. Said solvent may be selected from cyanide compounds, especially alkylcyanide compounds; ethers, including cyclic ethers; solvents having --S.dbd.O moieties, for example sulphone or sulphoxide solvents; and amides, including cyclic amides. (*emphasis added*)

3. Claims 27-30, and 33-50 are rejected under 35 U.S.C. 102(e) as being anticipated by Grieger (US5855811).

Concerning the organic solvent, Grieger teaches the following:

> To prepare a cleaning composition from TAAF, the TAAF is combined with a solvent. The solvent may be water, an **organic solvent**, or a combination thereof. Suitable **organic solvent**s include hydroxyl-containing solvents such as **methanol**, **ethanol**, n-propanol, iso-propanol, n-butanol, t-butanol, iso-butanol, sec-butanol, ethylene glycol, propylene glycol and mono- and polyhydric **alcohols** having higher carbon number. The composition is easily prepared simply by combining TAAF and solvent, and mixing these materials together to form a homogeneous composition, preferably a solution. (*emphasis added*)

Concerning the quaternary ammonium fluoride, fluoride ion source and the ammonium hydrogen fluoride, Grieger teaches the following:

> Tetramethylammonium **fluoride** is available commercially as the tetrahydrate, with a melting point of 39.degree.-42.degree. C. Aldrich Chemical Co., Milwaukee, Wis., sells this **tetramethylammonium fluoride**. The hydrate of **tetraethylammonium fluoride** is also available from the Aldrich Chemical Co. Either of these materials, which are exemplary only, may be used in the practice of the present invention. **Tetraalkylammonium fluorides** which are not commercially available may be prepared in a manner analogous to the published synthetic methods used to prepare **TMAF** and **TEAF**, which are known to one of ordinary skill in the art. (*emphasis added*)

Concerning the semiconductor, Grieger teaches the following:

> There are a large number of specific processes that can be used to planarize the surface of a **semiconductor wafer**, a few of which will be discussed later herein. However, it is generally the case that planarization will selectively remove surface material that constitutes the highest points of the surface, i.e., the points of the surface furthest from the base of the

> **semiconductor wafer**. In this way, the high points are removed and the surface topography of the **wafer** is planarized, also called leveled or flattened. The planarization process can be carried out on an already planar surface, in which case an entire layer of a **semiconductor wafer** may be removed. Regardless of the amount of material that is removed by a planarization process, a typical consequence of planarization is that a residue is left on the planarized surface. This residue may be termed planarization residue. (*emphasis added*)

Concerning the etch residues, Grieger teaches the following:

> Pure water, optionally in combination with scrubbing, is commonly used in the art to **remove planarization residue**. However, the prior art also describes methods and compositions which have been developed to more effectively and efficiently remove planarization residue from a semiconductor surface. For example, U.S. Pat. No. 5,478,436 to Winebarger et al. is directed to applying a cleaning solution to a semiconductor substrate having metal contaminants thereon, in order to remove the metal contaminants. The Winebarger et al. cleaning solution comprises an organic solvent and a compound containing fluorine. As another example, U.S. Pat. No. 5,389,194 to Rostoker et al. is directed to a **method of cleaning polishing residue** from a semiconductor device. The Rostoker et al. method uses a cleaning solution consisting essentially of phosphoric acid and hydrofluoric acid. (*emphasis added*)

Concerning the water free, Grieger teaches the following:

> HF, which is a gas, will cause serious harm when contacted with human skin, and thus should be a handled very carefully. It is available commercially as a solution in water, and it is preferably obtained and worked with in that form (albeit still very carefully, as aqueous HF is also hazardous to human skin). Aldrich Chemical Co., among many other suppliers, sells aqueous HF at various HF concentrations. Essentially any concentration of HF in water may be employed in preparing the inventive compositions, for example, compositions having from about 0.1 wt % to about 50 wt % HF in water are suitable. An aqueous HF containing essentially 49 wt % HF and 51 wt % water is a standard material of commerce, and is a preferred material for use in the present invention. **If a non-aqueous cleaning composition is desired, then HF gas may be bubbled into an organic solvent, such as methanol, to which may also be added TAAF or TAAH**. (*emphasis added*)

4. Claims 27-30, and 33-50 are rejected under 35 U.S.C. 102(e) as being anticipated by Vaartstra (US6666986).

Concerning the organic solvent, Vaartstra teaches the following:

> 14. A supercritical etching composition comprising a supercritical component selected from the group consisting of ammonia, an amine, an alcohol, water, carbon dioxide, nitrous oxide, an inert gas, a hydrogen halide, boron trichloride, chlorine, fluorine, a hydrocarbon, a fluorocarbon, **hexafluoroacetylacetone**, and combinations thereof, and a nonsupercritical component selected from the group consisting of ammonia, hydrofluoric acid, phosphoric acid, nitric acid, acetic acid, hydrochloric acid, sulfuric acid, hydrogen peroxide, nitrous oxide, nitrogen trifluoride, sulfur hexafluoride, ozone, sulfur dioxide, sulfur trioxide, **amines**, ammonium salts, **hexafluoroacetylacetone, and combinations thereof**. (*emphasis added*)

Concerning the quaternary ammonium fluoride, fluoride ion source and the ammonium hydrogen fluoride, Vaartstra teaches the following:

> 7. The composition of claim 2, wherein the selectivity enhancer is selected from the group consisting of **tetramethyl ammonium hydroxide**, **tetramethyl ammonium fluoride**, **ammonium fluoride**, and combinations thereof. (*emphasis added*)

Concerning the semiconductor, Vaartstra teaches the following:

> Supercritical etching compositions and methods for using such compositions are disclosed herein. The following description is illustrative of various embodiments of the invention. It is to be understood that the term substrate, as used herein, includes a wide variety of **semiconductor**-based structures that can be etched or have inorganic layers therein that can be etched. A substrate can be a single layer of material, such as a silicon (Si) **wafer**. Substrate is also to be understood as including silicon-on-sapphire (SOS) technology, silicon-on-insulator (SOI) technology, doped and undoped **semiconductor**s, epitaxial layers of silicon (Si) supported by a base **semiconductor**, as well as other **semiconductor**-based structures, including any number of layers as is well known to one skilled in the art. Furthermore, when reference is made to a substrate in the following description, previous process steps may have been utilized to form regions/junctions in a base **semiconductor** structure. It is also important to note that the substrate being etched can have a patterned mask layer thereon, such as, for example, a patterned resist layer, but it is not required. The following detailed description is,

> therefore, not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims. (*emphasis added*)

Concerning the etch residues, Vaartstra teaches the following:

> Supercritical fluids have been used to **etch residue** from a variety of surfaces or extract substances from various materials. A gas is determined to be in a supercritical state (and is referred to as a supercritical fluid) when it is subjected to a combination of pressure and temperature so that its density approaches that of a liquid (i.e., the liquid and gas state coexist). Supercritical fluids have been used to clean contact lenses by **etching residue** from lense surfaces, as disclosed by Bawa et al. in PCT Application Publication Number WO 95/20476. Supercritical fluids, namely carbon dioxide (CO.sub.2), have also been used to remove exposed organic photoresist films, as disclosed by Nishikawa et al. in U.S. Pat. No. 4,944,837, to form a patterned photoresist film. **As further disclosed in Nishikawa et al., once an underlying layer is patterned by conventional methods, supercritical fluids are used to remove the patterned resist film**. (*emphasis added*)

Concerning the water free and the organic solvent, Vaartstra teaches the following:

> 10. A **non-aqueous supercritical etching composition** comprising a supercritical component capable of etching an inorganic material of a semiconductor-based substrate, wherein the supercritical component is selected from the group consisting of ammonia, **an amine**, an **alcohol**, carbon dioxide, nitrous oxide, an inert gas, a hydrogen halide, boron trichloride, chlorine, fluorine, **a hydrocarbon, a fluorocarbon, hexafluoroacetylacetone**, and combinations thereof. (*emphasis added*)

It should be noted that "etching" and "cleaning" are related arts as both processes are directed at removing unwanted substances from a substrate.

5. Claims 27-30, and 33-50 are rejected under 35 U.S.C. 102(e) as being anticipated by Wojtczak (US6280651).

6. Wojtczak teaches various composition which are nonaqueous, contain a solvent, are free of water and finally are intended for use in cleaning semiconductors.

7. For example, Wojtczak exemplifies the following composition which meets all the applicant's material limitations:

Oxalic acid 2.5%
Tetramethylammonium fluoride 4.5%
Ethylene glycol 93%

8. Noting that ethylene glycol is an organic solvent and tetramethyl ammonium fluoride is a quaternary ammonium fluoride which functions as a fluoride source. Further noting that this composition is free of water.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglass McGinty can be reached on (571)272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

5/14/07

Gregory E. Webb
Primary Examiner
Art Unit 1751

gew